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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,062	11/24/2003	Patrick W. Tandy	MCT.0046CIUS (99-0200.02/	3265
7590 11/15/2004			EXAMINER	
Trop, Pruner & Hu, P.C. Suite 100 8554 Katy Freeway Houston, TX 77024			BROCK II, PAUL E	
			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 11/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/721,062

Applicant(s)

TANDY, PATRICK W.

Examiner

Paul E Brock II

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 31,32,35-39 and 42-49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 31,32,35-39 and 42-49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 October 0166 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 31, 32, 35 – 43, 48, and 49 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. The term "about" in claim 31 is a relative term which renders the claim indefinite. The term "about" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is not clear how "about 0.3 microns" the claimed range encompasses. Does the claimed range only read from exactly 0.25 microns to .35 microns? Or does the claimed range only read from exactly 0.25 microns to .26 microns? Is "about 0.3 microns" only exactly 0.3 microns? What is "about 0.3 microns" defining? The originally written specification does not clearly indicate what "about 0.3 microns" encompasses.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

5. Claims 44, 46, and 47 are rejected under 35 U.S.C. 102(a) as being anticipated by Haji et al. (JPPAT 11-067957, Haji¹).

Text citations are made to English translation document U.S. Patent 5909633 to Haji et al. (Haji²).

With regard to claim 44, Haji¹ discloses in figure 7, figure 9a and column 6, lines 9 – 13 and 31 – 50 an intermediate structure for an integrated circuit device. Haji¹ discloses in figure 4, figure 5, figure 7, figure 9a, and column 5, lines 1 – 19 a first bond pad (16/44) comprising a gold coated (26) metal (24/25), the gold coating having a thickness of between about 0.1 and 0.5 microns. It should be noted that 0.2 to 1.0 microns reads on the limitation of about 0.1 – 0.5 microns. Haji¹ discloses in figure 4, figure 5, figure 7, figure 9a, column 5, lines 40 – 42, column 6, lines 9 – 13 and 31 – 50 a second bond pad (14) which is masked (19), the second bond pad comprising a nickel coated (22) metal (21).

With regard to claim 46, Haji¹ discloses in figure 4, figure 5, figure 7, figure 9a, column 6, lines 9 – 13 and 31 – 50 wherein the second bond pad comprises a nickel coated (22) copper (21).

With regard to claim 47, Haji¹ discloses in figure 9a wherein the first and second bond pads are the same planar surface (top of 41).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 31, 32, 35 – 38, 42 – 43, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haji¹.

Text citations are made to English translation document U.S. Patent 5909633 to Haji et al. (Haji²).

With regard to claim 31, Haji¹ discloses in figure 9a a packaged integrated circuit device. Haji¹ discloses in figures 4, 5, 7 and 9a a plurality of solder ball bond pads (88/16 in Haji², 44/16 in Haji¹), the solder ball bond pads coupled to solder balls (90 in Haji², no reference # in Haji¹). Haji¹ discloses in figure figures 4, 5, 7 and 9a a plurality of wired bond pads (87/14 in Haji², 43/14 in Haji¹), the wire bond bond pads coupled to bonding wires (15). Haji¹ discloses in figure 4, figure 5, figure 7, figure 9a, column 6, lines 9 – 13 and 31 – 50 a first gold coating on the solder ball bond pads (62 in Haji², 26 in Haji¹) and on the wire bond bond pads (bottom portion of 61 in Haji², bottom portion of 23 in Haji¹), the first gold coating about 0.01 microns to 0.2 microns thick. Haji² is silent to the first gold coating being 0.25 microns to about 0.3 microns

Art Unit: 2815

thick. A first gold coating being 0.25 microns to about 0.3 microns is obvious. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the range of 0.25 microns to about 0.3 microns in the device of Haji¹ in order to optimize the thickness of the first gold coating. (See MPEP 2144.05 II.). Haji¹ discloses in figure 4, figure 5, figure 7, figure 9a, column 6, lines 9 – 13 and 31 – 50 a second gold coating (portion on wire bond bond pad not etched off) on the wire bond bond pads, the second gold coating and the first gold coating to form a composite gold coating. It should be noted that “forming a composite gold coating” is a product-by process limitation which does not structurally distinguish the claimed invention over the prior art.

With regard to claim 32, Haji¹ discloses in figure 4, figure 5, figure 7, figure 9a, column 6, lines 9 – 13 and 47 – 50 wherein the thickness of the gold on the solder ball bond pads is sufficiently low to reduce the likelihood of solder ball joint embrittlement.

With regard to claim 35, Haji¹ discloses in figure 5, figure 9a and column 5, lines 1 – 6 wherein the gold coating on the wire bond bond pads has a thickness of approximately 0.5 microns.

With regard to claim 36, Haji¹ discloses in figure 9a wherein the solder ball bond pads and the wire bond bond pads are all contained on the same planar surface (top of 41).

With regard to claim 37, Haji¹ discloses in figure 4, figure 9a, and column 5, lines 14 – 16 first (16) and second bond pad (14), the first and second bond pads comprising a nickel coated (22/25) metal (21/24). Haji¹ discloses in figure 4, figure 5, figure 7, figure 9a, column 6, lines 9 – 13 and 31 – 50 a first gold coating on the first (62 in Haji², 26 in Haji¹) and second (bottom portion of 61 in Haji², bottom portion of 23 in Haji¹) bond pads, the first gold coating about 0.01

Art Unit: 2815

microns to 0.2 microns thick. Haji² is silent to the first gold coating being 0.25 microns to about 0.3 microns thick. A first gold coating being 0.25 microns to about 0.3 microns is obvious. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the range of 0.25 microns to about 0.3 microns in the device of Haji¹ in order to optimize the thickness of the first gold coating. (See MPEP 2144.05 II.). Haji¹ discloses in figure 4, figure 5, figure 7, figure 9a, column 6, lines 9 – 13 and 31 – 50 a second gold coating (portion on second bond pads not etched off) on the second bond pads, the second gold coating and the first gold coating to forming a composite gold coating. It should be noted that “forming a composite gold coating” is a product-by process limitation which does not structurally distinguish the claimed invention over the prior art.

With regard to claim 38, Haji¹ discloses in figure 4, figure 9a and column 5, lines 11 – 12 wherein the first bond pad comprises a nickel coated copper.

With regard to claim 42, Haji¹ discloses in figure 5, figure 9a and column 5, lines 1 – 6 wherein the gold coating on the second bond pads has a thickness of approximately 0.5 microns.

With regard to claim 43, Haji¹ discloses in figure 9a wherein the first and second bond pads coexist on a planar support structure (41).

With regard to claim 48, Haji¹ discloses in figure 4, figure 5, figure 7, figure 9a, column 6, lines 9 – 13 and 31 – 50 wherein the solder bond pad comprises a nickel coated (22) copper (21).

Art Unit: 2815

8. Claims 39, 45, and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haji¹ as applied to claims 37, 38 and 44, respectively, above, and further in view of Thomas et al. (USPAT 5625734, Thomas).

With regard to claim 39, Haji¹ discloses in figure 4, figure 9a and column 5, lines 11 – 12 wherein the second bond pad comprises a nickel coated copper. Haji¹ is silent to the metal of the second bond pad being aluminum. Thomas discloses in column 3, lines 28 – 37 a second bond pad comprising aluminum. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the bond pad comprising aluminum of Thomas for the second bond pad of Haji¹ in order to use a material that is equivalent for the purpose of a bond pad.

With regard to claim 45, Haji¹ discloses in figure 4, figure 9a and column 5, lines 11 – 12 wherein the first bond pad comprises a nickel coated copper. Haji¹ is silent to the metal of the first bond pad being aluminum. Thomas discloses in column 3, lines 28 – 37 a first bond pad comprising aluminum. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the bond pad comprising aluminum of Thomas for the first bond pad of Haji¹ in order to use a material that is equivalent for the purpose of a bond pad.

With regard to claim 49, Haji¹ discloses in figure 4, figure 9a and column 5, lines 11 – 12 wherein the wire bond bond pad includes a nickel coated copper. Haji¹ is silent to the metal of the wire bond bond pad being aluminum. Thomas discloses in column 3, lines 28 – 37 a bond pad comprising aluminum. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the bond pad comprising aluminum of Thomas for the wire bond bond pad of Haji¹ in order to use a material that is equivalent for the purpose of a bond pad.

Response to Arguments

9. Applicant's arguments filed October 12, 2004 have been fully considered but they are not persuasive.

10. With regard to applicant's argument that "Haji fails to disclose a first gold coating on solder ball bond pads that is 0.25 microns to about 0.3 microns thick," it should be noted that the originally claimed invention claimed ranges of "between about 0.1 and 0.3 microns," and "about 0.25 microns". [Emphasis added]. Haji¹'s disclosed range of "about 0.01 to 0.2 micron" [emphasis added] anticipates the originally claimed ranges because "about" can be interpreted to mean the ranges overlap. However, newly claimed range matter of "0.25 microns to about 0.3 microns" is different than the originally claimed ranges. It is not longer clear what "about 0.3 microns" defines in the claims and applicant's originally filed specification. Further, the newly claimed ranges are clearly made obvious. Therefore, applicant's arguments are not persuasive and the rejection is proper.

11. With regard to applicant's argument that "pursuant to Haji, gold layers having a thickness above 0.2 microns interfere with the bonding force of solder bumps. Column 1, lines 26 – 59. Because Haji considers gold layers greater than 0.2 microns to be detrimental to bonding with solder bumps, it is respectfully submitted that Haji's upper limit for layer 62 is 0.2 microns not more," it should be noted that Haji¹ never explicitly puts an upper limit on the thickness of layer

Art Unit: 2815

62. In column 1, lines 26 – 59, Haji² states “Conventionally, the thickness of the gold layers 6, 7 was about 0.2 to 1 microns, and they were considerably thick... However, if the gold layers 6, 7 are too thick, bonding force of solder bump 10 drops.” [Emphasis added]. One of ordinary skill in the art would not place the “upper limit” of Haji¹’s gold layer at 0.2 microns. While Haji states that “about 0.2 microns to 1 microns” might be thick in the prior art, it is never clear what limit “about 0.2 microns” defines. Further, when Haji¹ states “too thick” one of ordinary skill would not interpret the original range of “about 0.2 microns to 1 microns”, which was described as “considerably thick”, to read on “too thick”. One of ordinary skill would recognize that some values in the range in the conventional art disclosed by Haji would have not been “too thick”. Instead, Haji’s disclosure would invite further interpretation of the “about 0.2 microns” to mean that somewhere around 0.2 microns bonding force of the solder bump would drop. This could easily be 0.3 microns, or 0.1 microns. An ordinary artisan would use routine experimentation to try a variety of values to see where the bonding force would drop to an unusable level. Also, Haji² continues to describe in column 1, lines 26 – 59 “if the gold layers 6, 7 are too thick, bonding force of solder bump 10 drops This is because, when forming the solder bump 10, the gold in the gold layer 7 is melted into the solder bump10 and is combined with tin in the solder to form a brittle compound.” Again, one of ordinary skill would recognize that the result of insufficient bonding force not only depends on the thickness of the gold, but also on the solder composition. Particularly, how much tin is in the solder will directly effect the thickness of the gold that can be tolerated. Thus, solder composition is another result-effective variable that one of ordinary skill in the art would recognize. Routine experimentation is needed to determine what “upper limit” of gold thickness on a solder bonding pad would be when a particular

Art Unit: 2815

composition of solder chosen. Given these considerations, one of ordinary skill in the art would not place the “upper limit” of Haji¹’s gold layer at 0.2 microns. Therefore, applicant’s arguments are not persuasive and the rejection is proper.

12. With regard to applicant’s argument that “Haji fails to render claim 31 as obvious because the first gold coating is part of a composite gold coating on the wire bond bond pads,” it should be noted that any deposited gold coating can be rendered a composite of the various layers of deposition. For example, when depositing the gold coating, a layer deposited from the beginning of deposition to a first arbitrary thickness, and any layer deposited over this arbitrary thickness, would constitute a composite. Further, because no structural distinction can be made between a “composite” of gold layers that have been continuously deposited, or a “composite” of gold layers that have been deposited in separates steps (i.e. deposit a layer, take it out of the deposition chamber, deposit another layer on it), any limitations referring thereto are product-by-process limitations. Thus, the product-by-process doctrine applies, the burden of proof now shifts to the applicant to explain how the products of the prior art and the claimed invention differ structurally. Therefore, applicant’s arguments are not persuasive and the rejection is proper.

13. With regard to applicant’s argument that “the thickness of the first claimed gold coating contributes to the thickness of the composite gold coating on the wire bond bond pads,” it should be noted that Haji¹ clearly reads on this feature. For instance, the second gold coating is removed from over the first gold coating only on the solder ball bond pad, see column 6, lines 8

Art Unit: 2815

– 12 of Haji². Thus, the entire thickness of the gold coating on the wire bond bond pad is a the sum of the thickness of the first gold coating and the thickness of the second gold coating, while the thickness of the gold coating on the solder ball bond pad is only the thickness of the first gold coating. Therefore, applicant's arguments are not persuasive and the rejection is proper.

14. In response to applicant's argument that "Haji fails to render claim 31 obvious because 0.25 microns of gold provides a coating on solder ball bond pads that is sufficiently small to reduce solder ball joint embrittlement, yet thick enough to prevent oxidation. Specification, page 5, lines 17 – 25," it should be noted that applicant's specification on page 5, lines 17 – 25 states "the solder ball bond pads may have a gold coating with a thickness on the order of 0.1 to about 0.3 microns. One advantageous coating thickness is about 0.25 microns. In general, it is desirable to provide a coating thickness on the solder ball bond pads which is sufficiently small to reduce solder ball joint embrittlement. It is also desirable to have a coating which is thick enough to prevent oxidation." [Emphasis added]. Nowhere in this section of applicant's originally filed specification does it state that 0.25 microns of gold is required to have the intended use of reducing solder ball joint embrittlement, yet thick enough to prevent oxidation. Further, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA

Art Unit: 2815

1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). Therefore, applicant's arguments are not persuasive and the rejection is proper.

15. With regard to applicants' argument that "a second bond pad which is masked... Haji fails to disclosed that the resin 19 is used to create features consisting of lines and spaces," it should be noted that applicant's narrow definition of masking is an intended use and/or method of using limitation which is not patentable subject matter in a device claim. In figure 7 of Haiji¹ and figure 14 of Haji² the resin 19 is clearly masking the wire bond bond pads from etching. The intended use of "patterning" as the only interpretation of "masked" imparted by the applicant's arguments does not structurally distinguish the claimed invention over the prior art. Further, Haji's 19 also serves the intended purpose of masking the second bond pad. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. Therefore, applicant's arguments are not persuasive and the rejection is proper.

16. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "masking") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van*

Art Unit: 2815

Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Therefore, applicant's arguments are not persuasive and the rejection is proper.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul E Brock II whose telephone number is (571) 272-1723. The examiner can normally be reached on 8:30 AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Paul E Brock II

A handwritten signature in black ink, appearing to read "Paul E Brock II", with a stylized flourish at the end.